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ABSTRACT

This study examined regulatable quality and teacher-child interaction and, their influences on the quality of the attachment relationship developed by preschool children with their day care teachers. Observation and interview procedures were completed in 12 classrooms serving 194 preschoolers. Regulatable quality variables included teacher-child ratio, class size, and teacher qualifications. Teacher-child interaction was assessed with respect to rate, content (traditional, socially-oriented, or control/disciplinary style), and affective tone. Results indicated that class size and teacher-child ratio were especially variable, because classes were often combined for joint activities or were divided into small groups. Negative teacher affect occurred infrequently, but flat emotional tone was not uncommon. Controlling for child age, it was found that class size was negatively related to teacher-child ratio and teacher qualifications, and teacher-child ratio was positively related to teacher qualifications. The rate of teacher-child interaction was positively related to traditional and socially-oriented interactions. Control interactions were related to negative and neutral teacher affect, and negatively related to positive teacher affect. Class size was negatively related to interaction rate and traditional- and socially-oriented interactions. Teacher-child ratio was related to interaction rate and traditional interaction. Children's attachment security scores were negatively associated with neutral teacher affect and control interaction. The composite variables of quality and teacher-child interaction, formed from the results of a principle components analysis, were used in multiple regression analyses. Tentative support was found for paths between: (1) low quality teacher-child interaction and children's insecurity in the teacher-child relationship; and (2) regulatable quality and high quality teacher-child interaction. (Contains 21 references.) (KDFB)

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Contributions of Regulatable Quality and Teacher-Child Interaction to Children's Attachment Security with Day Care Teachers

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Abstract

Regulatable quality and teacher-child interaction were examined with respect to their influences on the quality of the attachment relationship children develop with their day care teachers. Observation and interview procedures were completed in 12 classrooms serving 194 preschool-age children. Results indicated that children's experiences varied widely in all three domains. Furthermore, tentative support was found for paths between (a) low quality teacher-child interaction and children's insecurity in the teacher-child relationship and (b) regulatable quality and high quality teacher-child interaction. Findings are discussed in terms of the wide variability in children's day care experiences and the roles of regulatable quality and teacher-child interaction in children's socioemotional outcomes.

Early day care research is characterized by assessments of regulatable features and their associations with children's outcomes. Studies of regulatable quality implicate factors such as class size, teacher-child ratio, and teacher training and education as regulatable features of care related to children's development. These indices, however, are limited in terms of capturing aspects of children's daily experiences. More recently, day care research has extended beyond examining regulatable aspects of quality to include dynamic processes occurring within the classroom (McCartney & Galanopoulos, 1988). One such process is the verbal interaction occurring between children and teachers. Certain characteristics of teacher-child interaction, such as its rate, content, and affective style, are associated with children's outcomes. Specifically, meaningful and positive interaction that occurs frequently between teachers and children facilitates children's cognitive, language, and socioemotional development (McCartney, 1984; Phillips, McCartney, & Scarr, 1987).

Teacher-child interaction may have implications for a second classroom process involving the quality of the relationship that develops between each child and his/her teacher. Previous research suggests that when a child spends a significant amount of his/her day in a stable day care arrangement, the teacher-child relationship may acquire the characteristics of an attachment relationship (Ainslie & Anderson, 1984), which in and of itself has implications for children's outcomes (Anderson, Nagle, Roberts & Smith, 1981; Howes, Rodning, Galluzzo, & Myers, 1992).

Because few studies have included assessments of all three domains, it remains unclear how regulatable quality, teacher-child interaction, and the teacher-child relationship are related. Therefore, the purposes of the present study were to (a) examine children's experiences with respect to each of these domains, and (b) provide an empirical test examining the proposed relations (see Figure 1) between regulatable quality, teacher-child interaction, and children's attachment relationships with their day care teachers.

Figure 1: Model of Hypothesized Paths of Influence to be Tested in Present Study

Method

Subjects

Subjects were 194 children (92 girls) ranging from 36- to 71-months of age attending one of 12 day care classrooms.

Procedure

Data collection took place in the form of classroom observations and teacher interviews. Regulatable quality variables included teacher-child ratio and class size, both of which were averaged for each child over a possible 200 rounds of classroom observation, and teacher qualifications, assessed during interviews in which teachers provided information about educational, training, and experiential backgrounds. Scores for all teachers in a given classroom were averaged to yield an overall teacher qualifications score for the children in that classroom.

Teacher-child interaction was assessed with respect to rate, content, and affective tone experienced by each child over 100 rounds. The rate of interaction was calculated as the total number of interactions the child experienced divided by the number of rounds s/he was present. Interaction content was coded as the one category (see Table 1) reflecting its dominant theme. Teacher-child interaction also was coded with regard to teachers' affective tone during the exchange; categories included positive (i.e., warm and friendly), negative (i.e., hostile or irritable), or neutral (i.e., flat or inexpressive). Ratio scores for the three types of affect then were created for each child.

The quality of the teacher-child relationship was assessed using the 90-item Attachment Q-Set (AQS; Waters, 1987; Waters, Vaughn, Posada, & Kondo-Ikemura, 1995). Each child was observed by two trained students for a minimum of three hours across a variety of normal activities in the day care setting. Observers then independently completed the 90-item AQS. The two sorts (mean correlation of .65) were averaged to yield a composite score for each item, which was correlated with the standard criterion sort of security derived from sorts by expert judges to yield a security score for each child (Waters et al., 1995).

Table 1

Description of Categories of Teacher-Child Interaction

Caregiving	Teacher takes care of child's physical needs.
Instruction	Teacher gives a lesson or teaches child how to do something.
Conversation	Teacher expresses opinions or feelings or holds a discussion.
Social Facilitation	Teacher encourages cooperation or addresses social situations.
Play	Teacher initiates or engages in play activity.
Control	Teacher uses disciplinary techniques, such as time-out or verbal warnings.

Results

Descriptive Statistics for Regulatable Quality, Teacher-Child Interaction, and the Teacher-Child Relationship

Regulatable quality. Ranges, means, and standard deviations are provided in Table 2. Raw scores for class size ranged from 5 to 46 children, whereas the average class size per child (i.e., the average class size score across the total number of observational rounds a child was present) rnaged from 9.51 to 24.33 children. Raw scores reflecting the number of teachers in the classroom during a given round of observation ranged from 0 to 7. The average number of teachers per child (i.e., the average

number of teachers across the total number of observational rounds the child was present) ranged from 1.02 to 2.61 with a mean of 1.83. Teacher-child ratios (i.e., the average number of teacher score divided by the average class score) ranged from .06 (ratio = 1:16.67) to .21 (ratio = 1:4.76) with a mean of .13 (ratio = 1:7.69). The overall teacher qualifications score (i.e., the average of all teachers in a given classroom and including years of experience in the field of day care, specialized training in child development and care, and level of educational attainment) ranged from .50 to 3.75 (of a possible 4.0) with a mean of 2.27 for the full sample.

Table 2

Descriptive Statistics for Regulatable Quality and Teacher-Child Interaction Variables

	Minimum	Maximum	Mean	sd
Regulatable Quality				
Class size	9.51	24.33	15.15	3.79
Teacher-Child Ratio	.06	.21	.13	.03
Teacher Qualifications	.50	3.75	2.27	.99
Teacher-Child Interaction				
Rate	.06	.84	.50	.17
Instruction	2.00	53.00	17.87	9.99
Conversation	1.00	33.00	11.58	6.40
Custodial Care	.00	10.00	2.04	2.06
Play	.00	12.00	5.75	2.37
Social Facilitation	.00	8.00	1.08	1.35
Control	.00	50.00	5.34	3.69
Positive Affect	.24	10.25	1.26	1.44
Negative Affect	.00	.19	.03	.04
Neutral Affect	.10	3.75	1.19	.63

Teacher-child interaction. Ranges, means, and standard deviations are listed in Table 2. Rate of interaction ranged from .06 to .84 with a mean of .50. The ratio of positive teacher affect ranged from .24 to 10.25 with a mean of 1.26, and neutral affect ranged from .10 to 3.75 with a mean of 1.19. Negative affect ranged from 0 to .19 with a mean of .03, indicating that relatively low levels of negative affect were demonstrated by teachers. Of the content categories of teacher-child interaction, instruction and conversation occurred most frequently, followed by control, play, custodial care, and social facilitation. To reduce this set of variables, a principle components analysis was conducted and a three component solution best fit the data (see Table 3). These factors were assumed to represent *styles* of teacher interaction and included traditional, socially-oriented, and control/disciplinary interaction.

Teacher-child relationship. Security scores, after being standardized within each class, ranged from -2.85 to 1.93 with a mean of 0.

Table 3

Principle Components Analysis of Teacher-Child Interaction Categories

	Traditional	Social	Control
Instruction	.81	-.02	-.02
Conversation	.69	.17	.19
Custodial Care	.60	.05	-.51
Social Facilitation	.00	.85	.24
Play	.22	.66	-.49
Control	.15	.09	.73

Intercorrelations among Variables

To examine the relations among variables, correlations were computed within and between domains for the full sample (see Table 4). Because many of the predictor variables were significantly associated with child age, partial correlations controlling for child age were calculated. Among variables

Table 4

Correlations among Variables

	1	2	3	4	5	6	7	8	9	10
1. Class size										
2. Teacher-child ratio	-.67**									
3. Teacher qualifications	-.61**	.61**								
4. Rate of interaction	-.58**	.69**	.68**							
5. Negative affect	-.09	.05	.01	.12						
6. Positive affect	-.14	.09	.25**	-.05	-.28**					
7. Neutral affect	-.06	.03	.01	.01	.11	-.56**				
8. Traditional interaction	-.50**	.68**	.62**	.88**	.10	-.08	.00			
9. Socially-oriented interaction	-.30**	.01	.18*	.22**	.07	.18*	-.11	.00		
10.Control interaction	-.13	-.03	-.08	.00	.27**	-.28**	.36**	-.01	.01	
11.Security	-.01	.02	.01	-.01	-.11	.11	-.33**	-.01	-.03	-.20**

representing regulatable quality, class size was negatively related to teacher-child ratio and teacher qualifications, while teacher-child ratio was positively associated with teacher qualifications. Within the domain of teacher-child interaction, rate of interaction was positively related to traditional and socially-oriented interaction. Positive teacher affect was inversely associated with neutral and negative affect. Control interactions were positively related to negative and neutral teacher affect and inversely related to positive teacher affect. Socially-oriented interaction was associated with positive teacher affect.

Correlations between domains indicated that class size was negatively associated with overall rate of interaction, traditional interaction, and socially-oriented interaction. Teacher-child ratio was positively correlated with overall ate of interaction and traditional teacher-child interaction. Teacher qualifications had a positive association with overall rate of interaction, positive teacher affect, and traditional and social interaction. Children's security scores were negatively associated with neutral teacher affect and control interactions.

Relations between Regulatable Quality, Teacher-Child Interaction, and Teacher-Child Relationship Domains

A principle components analysis was conducted with the full set of variables, excluding security scores, to examine whether variable loadings on factors would be similar to the latent variables illustrated in Figure 1. Results (see Table 5) suggested one component representing regulatable quality and another representing low quality teacher-child interaction. These results were used to inform the creation of two composite variables, including regulatable quality, calculated as the mean of class size, teacher-child ratio, and teacher qualifications, and low quality teacher-child interaction, calculated as the mean of control interactions and negative and neutral teacher affect.

The composite variables were used in a series of multiple regression analyses, which were conducted in order to examine the paths proposed in Figure 1. In the first regression analyses, low quality interaction and regulatable quality composites were entered on the first step and significantly

Table 5

Principle Components Analysis to Support Latent Variables

	Regulatable Quality	Low Quality Interaction
Rate of interaction	.92	.03
Traditional interaction	.91	.04
Teacher-child ratio	.83	.08
Teacher qualifications	.74	-.28
Class size	.61	.21
Positive teacher affect	.03	-.81
Neutral teacher affect	.04	.78
Control interaction	-.05	.58
Negative teacher affect	.06	.55
Socially-oriented interaction	.05	-.07

predicted security ($R^2 = .08$, $p < .001$). Security was no longer predicted, however, when low quality interaction was removed. Although no composite was created to reflect high quality interaction because these variables were too diverse to load on one factor, each high quality interaction variable was regressed on the regulatable quality composite. Results indicated that regulatable quality significantly predicted the overall rate of interaction ($R^2 = .57$, $p < .001$), traditional interaction ($R^2 = .53$, $p < .001$), and positive teacher affect ($R^2 = .04$), $p < .01$).

Taken together, the results of the preceding analysis suggest an alternate conceptual model (see Figure 2). Only a portion of this model, however, could be tested using EQS (Bentler, 1995) due to the lack of convergence between the variables indicative of high quality interaction. Indicators (V) for regulatable quality (F1) included type of program (V1), class size (V2), teacher-child ratio (V3), and

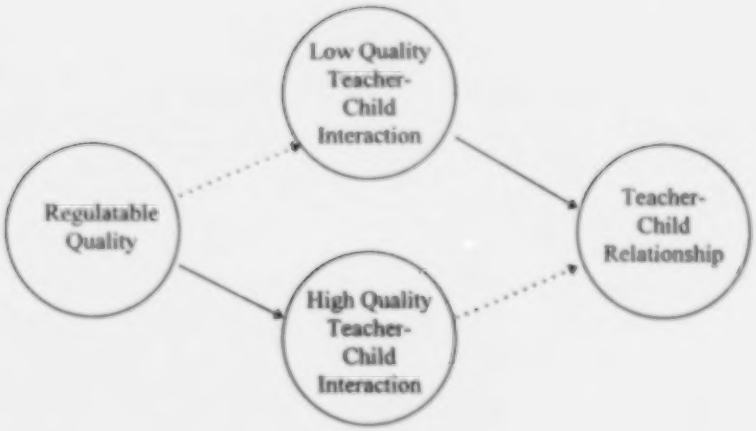

Figure 2: Adjusted Conceptual Model

teacher qualifications (V4). Indicators for low quality teacher-child interaction (F2) included negative (V5) and neutral teacher affect (V6) and control interactions (V7). Security (V8) was the only indicator for the teacher-child relationship (F3). EQS analysis indicated that the path from the low quality interaction factor to security was statistically significant whereas the path from regulatable quality to low quality interaction was not (see Figure 3). Furthermore, path estimations revealed that negative teacher affect was not a good indicator for the low quality interaction factor.

Conclusions

Descriptive Summaries

Regulatable quality. The children in this study experienced a range of regulatable quality, particularly with respect to class size and teacher-child ratio. Observers noted that classes often were combined for joint activities, such as outdoor play or watching a videotape, which resulted in very large class sizes (e.g., over 40 children). Classes also were divided into small learning groups, and consequently, class sizes occasionally were less than eight children. Average class sizes ranged from 10 to 24, suggesting that some children regularly experienced class sizes that were relatively large.

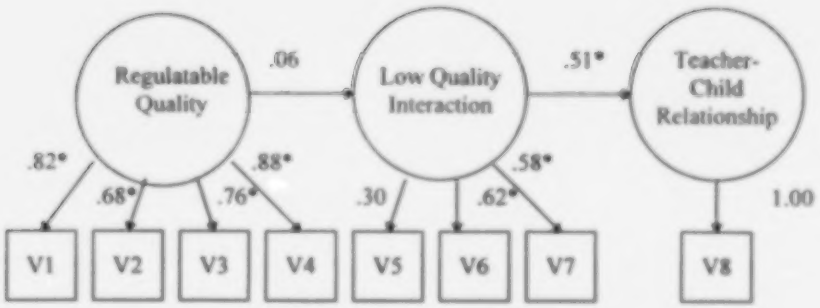

Figure 3: EQS Model with Path Coefficients

According to guidelines from several sources (e.g., 1980 Health, Education, and Welfare Day Care Requirements, NAEYC Criteria for High Quality Early Childhood Programs, and Child Welfare Leagues of America's Standards for Day Care Services), class sizes of 24 children are not optimal, even for children in elementary school (Phillips, 1986). Variation also was evident in terms of the teacher-child ratios experienced by children. Although observers noted several instances in which no teacher was present in the classroom, children did not regularly experience a classroom setting without an adult present. Child care guidelines recommend teacher-child ratios of 1:7 to 1:9 in classrooms serving preschool children (Phillips, 1986). Whereas the overall average ratio in the present study (1:8) meets this criterion, some children experienced an average ratio as high as 1:17.

Teacher-child interaction. On average, interaction with the teacher occurred in 50% of the rounds a child was present, although wide variation in rates of interaction was apparent. Negative teacher affect occurred relatively infrequently, as has been documented in previous research (e.g., Innes, Banspach, & Woodman, 1982; Tizard, Cooperman, Joseph, & Tizard, 1972). However, it was not uncommon for teachers to display an emotional tone that is flat or matter-of-fact. Variability in affective tone may occur as teachers naturally find daily interactions with some children more positive than with others (Elicker & Fortner-Wood, 1995). Expressed affect also may be a reflection of the educational and training background of teachers. That is, more highly qualified teachers are more likely to exhibit high

levels of warmth and friendliness, compared to less qualified teachers (Arnett, 1989; Howes, 1983). With regard to the content of interaction, instruction and conversation occurred most often and were characteristic of the traditional interaction style. Traditional interaction may be more likely to occur because they are seen as supporting children's cognitive and social development (Dickinson & Smith, 1991; File, 1984).

Relations among Variables

The variables in this study were correlated with each other in reasonable and moderate ways. Correlations among regulatable quality variables indicated that smaller class sizes were associated with more favorable teacher-child ratios and more highly qualified teachers. Concerning teacher-child interaction, children who had higher overall rates of interaction from teachers also experienced higher levels of both traditional and socially-oriented teacher-child interaction. Moreover, certain styles of interactions were associated with specific affective tones. For example, control interactions were more likely to be accompanied by flat or irritable emotional tone on the part of the teacher. In contrast, when interactions focused on social situations, teachers were more likely to demonstrate warmth and friendliness.

Aspects of regulatable quality were associated with teacher-child interaction variables in expected ways. In smaller classes with more favorable teacher-child ratios, children received more frequent interaction and higher levels of traditional interaction. Socially-oriented interaction also was more likely to occur in classes with fewer children. Highly qualified teachers were more likely to provide higher levels of overall interaction, warmth and friendliness, and traditional and socially-oriented interaction. These findings were consistent with previous research (e.g., Berk, 1985; Howes, 1983; Vandell & Powers, 1983) and suggest that high quality in terms of regulatable features sets the stage for more frequent, meaningful, and warm interaction from teachers to children. Furthermore, aspects of interaction were related to children's security with teachers. Specifically, children were more secure

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when they received fewer control interactions and experienced lower levels of a flat or neutral emotional tone from teachers.

Paths between Domains

The results of this study provide some support for the pathways illustrated in Figures 1 and 2. Although regulatable quality did not contribute to low quality teacher-child interaction, it did predict aspects of high quality interaction. Specifically, high levels of regulatable quality predicted more frequent interactions characterized by teaching and conversational behaviors and accompanied by a warm emotional tone. As expected, no evidence suggested that regulatable quality had direct influences on children's security. Indeed, the focus on regulatable quality is not because it is thought to shape children's outcomes; rather, this and other studies demonstrate that indices of regulatable quality are important insofar as they identify the circumstances in which high quality teacher-child interaction is likely to occur (Zaslow, 1991).

Low quality interaction, characterized by high levels of disciplinary actions and flat teacher affect, contributed to low levels of security. Whereas previous research reveals that teacher sensitivity during interactions is associated with secure teacher-child relationships (Howes & Hamilton, 1992), the present study provides evidence about what negative aspects of interaction influence attachment security. One might expect teachers' demonstrations of hostility or irritability to adversely affect the relationship a child develops with his/her teacher; however, the current findings implicate a neutral or flat emotional tone, which commonly was displayed by teachers, as having a detrimental influence on security.

To conclude, the results of this study indicate that children experience a range of quality at both regulatable and interaction levels. Furthermore, the findings indicate that regulatable quality is important insofar as it facilitates high quality teacher-child interaction, but it is low quality interaction, characterized by high levels of discipline and flat teacher affect, that contributes to low levels of security in the teacher-child relationship.

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